

Screw-worm Activities August 1956

Research Line Project ENT h2-15 Development of improved media and mass rearing and distribution techniques for screw-worm eradication

A. Variations of standard medium for larval development (Graham, Dudley)

The following media formulations were compared to determine the effect of substituting a higher percentage of blood for meat:

	Bithlo (standard)	Proportions of ingredients new media		
		A	B	C
Meat	8	7	6	5
Water	7	7	6	5
Blood	4	5	6	7
Formalin	0.2	0.2	0.2	0.2

Equal numbers of larvae were started on the standard medium, then transferred to the above media formulations after 24 hours. One standard rearing tray for each formulation was used. Media B and C became too soupy and were discarded. Approximately 4,950 larvae finished growth on the standard medium compared to 4,500 on medium A. By observation the standard medium appeared to be of the best consistency for the larvae. Other variations of the medium are to be tested.

B. Large tray for larval rearing (Graham, Dudley)

Three tests were completed in which a large galvanized tray 8' x 2' x 1 1/2" was used to grow the larvae. The frame work on which the

tray rested was enclosed with blanket insulation for retaining heat underneath. Heat was supplied from 150-watt light bulbs. Larvae were started and finished in the tray. Under these conditions larvae pocketed well and fed downward, indicating better utilization of the medium. The handling of larvae and rearing equipment would be considerably reduced in large units. The indications are that an estimated 100,000 larvae can be reared in a tray 4' x 10' on four man-hours.

The results of initial tests with the large tray are shown in the following tabulation:

<u>Medium containing</u>	<u>Larvae finished</u>	<u>Number of pupae per cc.</u>	<u>Pounds of meat per 1,000 larvae</u>	<u>Man-hours</u>
Horse meat	50,000	8.8	1.36	4
Beef heart	70,000	7.5	1.25	4

C. Efficiency of rearing medium

(Baumhover)

Several tests were conducted to increase the efficiency of the larval-rearing-medium. Previous tests by Mr. Graham indicated the value of substituting plasma for whole blood in the starting medium. In the test reported here this substitution was made throughout the larval-feeding period, yielding 918 larvae per pound of meat compared to 504 larvae per pound of meat in the standard medium. However, the larvae reared in the 20% plasma medium were slightly smaller, averaging 79.4 mg. compared to 83.4 mg. for the standard. Because of its availability human plasma was used.

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(Bannhoyer)

Several tests were conducted to increase the efficiency of the larval-rearing-medium. Previous tests by Mr. Graham indicated the value of substituting plasma for whole blood in the starting medium. In the test reported here this substitution was made throughout the larval-feeding period, yielding 218 larvae per pound of meat compared to 204 larvae per pound of meat in the standard medium. However, the larvae reared in the 20% plasma medium were slightly smaller, averaging 79.4 mg. compared to 83.4 mg. for the standard. Because of its availability human plasma was

used.

This test was followed with a comparison of no blood or its components; 10%, 20%, and 40% bovine plasma, 20% human plasma, and 20% packed red cells. At 48 hours larvae in media containing 20% and 40% bovine plasma had all reached the 3rd instar compared to a very small number of 3rd instar larvae in the standard. Larvae in media containing no blood, and packed red blood cells were greatly retarded at 48 hours although the reduced number of larvae completing growth averaged 74.0 and 71.6 mg., respectively, compared to 69.6 for the standard. After 48 hours results from media containing plasma were disappointing. The conditions appeared unsuitable for the larvae with considerable crawl-off being noted. For this test larvae were reared in Kys-ite trays made of a plastic material which does not readily conduct heat. A check of the larval concentrations in the plasma media indicated a higher temperature present than in aluminum trays or in plastic trays in which the growth rate was slower than that in plasma media.

The third test utilizing the same trays, but with a lowered cabinet temperature confirmed this observation. In this test a 20% plasma medium appeared suitable and produced 951 larvae per pound of meat compared to 700 for the standard. Again, larvae reared in 20% plasma were somewhat smaller than the standard, averaging 64.0 mg. compared to 68.2 mg. for the standard.

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The third test utilizing the same trays, but with a lowered cabinet temperature confirmed this observation. In this test a 20% plasma medium appeared suitable and produced 921 larvae per pound of meat compared to 700 for the standard. Again, larvae reared in 20% plasma were somewhat smaller than the standard, averaging 61.0 mg. compared to 68.2 mg. for the standard.

At the suggestion of Mr. Brandstein, bovine blood albumin was substituted for whole blood. Medium containing 2% albumin (on basis of dry weight) produced 751 larvae per pound of meat while 4% albumin produced 843 larvae per pound of meat. The former averaged 73.3 mg. while the latter averaged 74.8 mg., compared to 68.2 for the standard.

Since the possible influence of the water used in larvae media has not been investigated, a single test was conducted comparing deep-well, unchlorinated water from the Bithlo Laboratory with Orlando tap water and distilled water. Distilled water produced only 392 larvae per pound of meat compared to 455 for Orlando tap water and 766 for the Bithlo water. Larval weights were as follows: Distilled water - 76.2 mg., Orlando tap water - 69.0 mg., and Bithlo water - 75.1 mg.

D. Stocking-rate--Holding cages

(Baumhover, Graham, Dudley)

Further data have been obtained on the optimum number of flies held in standard holding cages for egg production. Four cages each, were stocked at the rate of 500, 750, and 1,000 flies (both sexes). The 500 rate (250 females) averaged 3.06 gm. of eggs per cage or 245 eggs per female based on the original estimated number of females. The 750 rate averaged 3.2 gm. per cage or an average of 171 eggs per female while the 1,000 rate averaged 4.18 gm. per cage or 167 eggs per female. Obviously the 500 rate gives the maximum efficiency since the total egg production was almost as great as in the cages containing 750 flies. Increasing the 500 rate 100/^{percent} (1,000 rate) gave only a 37% increase in total egg production per cage.

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E. Identification of trapped screw-worm flies

(Baumhover)

Twenty fresh screw-worm females caught during the trapping studies were dissected to study egg development. All of the females examined contained eggs in the pre-oviposition stage, indicating that it may be possible to distinguish in the field, released sterile females from normal females caught in traps if trapping intervals are sufficiently short to provide fresh specimens. Further observations will be made.

F. Egging with larval medium

(Graham, Dudley)

Unused medium beneath feeding larvae was highly attractive to gravid female flies in the colony cages. In four widemouthed pint jars containing this medium 70,000 eggs from a single cage were deposited. A similar cage of flies from the same culture deposited 44,000 eggs in vials, (standard egging procedure).

The medium tested for oviposition was 48 hours old, of a red color with an acid reaction. Six- and seven-day old flies held at 80° F. readily deposited on the material. Oviposition begins from 10-15 minutes after it is placed in the cages, is heavy for the following thirty minutes and is completed about an hour later. Seven-day-old flies excluded from the material by screen, deposited eggs three inches above it around the inner lip of the beaker. These observation tests were conducted in a room of 80° F. The egging material was heated by placing the jars in cups of warm water.

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G. Ecological studies

(Skipper, Dudley)

The incidence of adult screw-worm flies in nature as determined by catches from eight status traps are shown in the following tabulation:

<u>Trap location</u>	<u>Number of <i>C. hominivorax</i> taken</u>
	<u>Trapping period</u> <u>7/11/56 - 7/31/56</u>
Brooksville	10
Ocala National Forest	52
Trenton	3
Perry	9
Lake City	45
Macclenny	38
Yulee	0
Christmas	344

The above tabulation indicates a rather high incidence of screw-worms throughout the trapped area except in the northeastern part of the State in the vicinity of Yulee.

Research Line Project ENT h2-16 Development of attractants for estimating and controlling natural screw-worm populations

(Brandstein)

During this period, tests for attractancy yielded negative data; no new attractants were developed.

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Research line Project ENT 2-16 Development of attractants for estimating and controlling natural screw-worm populations

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Field tests:

One field test was completed and another one started. Trap number six in the completed test drew large numbers of screw-worm flies. However, the unreported data from the incomplete field tests shows that when the bait was switched to a plain liver baited trap, it still caught large numbers of screw-worm flies. The positional difference is striking because traps one mile on either side have caught lesser numbers for over a month. The completed test is reported:

Baits:

Trap 1:	Not used
Trap 2:	Liver bait
Trap 3:	Liver and egg-yolk bait
Trap 4:	Liver and egg-yolk bait
Trap 5:	Liver bait
Trap 6:	Heart and egg-yolk bait
Trap 7:	Liver and egg-yolk bait
Trap 8:	Liver bait

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Tabulation of results of field test using several attractants as baits.

	7-11		7-13		7-16		7-18		7-20		7-23		August*		Total	
	: Catch :		: Catch :		: Catch :		: Catch :		: Catch :		: Catch :		: Catch :		: Catch :	
Trap No.	S.W.F.	in cc.	S.W.F.	in cc.	S.W.F.	in cc.	S.W.F.	in cc.	S.W.F.	in cc.	S.W.F.	in cc.	S.W.F.	in cc.	S.W.F.	in cc.
1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
2	2	95	2	20	4	450	9	330	8	220	8	540	26	800	59	2,635
3	1	100	2	180	4	510	x	x	6	575	7	750	15 ^{2/}	1,450	34	3,565
4	5	103	8	290	8	300	31	420	14	400	11	560	7	270	84	2,343
5	9	150	12	150	23	350	49 ^{1/}	525	14	220	35	200	44 ^{2/}	315	186 ^{3/}	1,910
6	5	100	30 ^{4/}	260	89	750	78	450	100	365	130	685	118 ^{1/}	750	548 ^{1/}	3,310
7	9	125	12	170	26	280	26	290	26	250	26	215	70	320	195	1,620
8	<u>0</u>	<u>8</u>	<u>1</u>	<u>20</u>	<u>1</u>	<u>30</u>	<u>1</u>	<u>20</u>	<u>3</u>	<u>50</u>	<u>0</u>	<u>20</u>	<u>--</u>	<u>--</u>	<u>6</u>	<u>148</u>
Total	31	681	65	1,220	155	2,620	194	2,035	171	2,060	217	2,970	279	3,905	1,112	15,531

* No bait added on 7-23

X No valid catch

1/ Includes 3 males

2/ Includes 1 male

3/ Includes 4 males

4/ Includes 2 males

[illegible]

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